

Norton Sound Summer Commercial Red King Crab Fishery
Observer Project Summary Report, 1993

By

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INTRODUCTION

The Norton Sound Section of the Northern Bering Sea District consists of all waters in statistical area Q that are north of the latitude of Cape Romanzof, east of 168 west longitude, and south of the latitude of Cape Prince of Wales (Figures 1 and 2). A large vessel summer commercial red king crab (Paralithodes camtschatica) fishery has existed in the Norton Sound Section since 1977 (Appendix Table 1) until the 1993 season. Regulation changes adopted during the March 1993 Board of Fisheries meeting changed the character of the 1993 fishing fleet to that of a small boat fleet. No summer commercial fishery occurred in 1991 due to a lack of staff to properly manage the fishery. The budget had been cut the previous winter. In 1992 the summer commercial fishery resumed.

The National Marine Fisheries Service conducted their triennial trawl survey to examine the abundance of Norton Sound red king crab in late August 1991 (Appendix Table 2). The results of that survey as compared to the 6 previous trawl surveys show a gradual trend of increasing abundance since the low of 1982, with 3.4 million pounds of legal king crab in the commercial fishing district in 1991. The quota for the Norton Sound Section for the 1993 season was therefore set at 340,000 pounds, representing an exploitation rate of approximately 10%.

The 1993 summer commercial red king crab fishery opened at 12 noon, July 1 in the Norton Sound Section of the Eastern Bering Sea. The fishery was closed by emergency order at 12 noon, August 28, 1993 when it was anticipated that the quota of 340,000 pounds would be harvested. The closure announcement was made on August 26 to provide a 48 hour notice.

Fourteen small catcher vessels took part in the summer commercial crab season. One processor took part in the fishery, and had an independent fishery observer on board. This is a change from past summer fisheries in Norton Sound when the fleet consisted of large catcher vessels and more than one processor. This is the fourth year subcontracted observers were placed on board commercial vessels in the Norton Sound Section. During the 1993 summer season an ADF&G observer was not placed on board a crab vessel in Norton Sound. An ADF&G port sampler was stationed in Nome to sample crab on vessels that delivered to buyers in Nome. In 1989, the Board of Fisheries adopted a regulation (5AAC 39.645) mandating that all catcher/processors and floating processors which process shellfish have independent observers on board. These observers are certified by the ADF&G and work for independent contractors. The onboard observer program provides the only effective means of collecting essential biological and management data from vessels that process shellfish. This data is necessary in determining the magnitude and location of the commercial harvest and the status of the stock. The observers also provide the only effective means to enforce size and sex restriction regulations that will protect the resource. Catcher vessels are not required to have observers onboard, but may choose to allow an ADF&G observer onboard to collect data essential to the management of the fishery.

During the March 1993, Board of Fisheries meeting, a new regulation (5AAC 34.925) was put into effect regarding the pot limit. The king crab pot limit for the Norton Sound Section or Area Q3 states that no more than 40 pots may be operated

from a vessel of 125 feet or less in length, or 50 pots if the vessel is larger than 125 feet.

Objectives and Tasks

The specific objectives and tasks of the observer program are to:

1. Report daily the number of pots pulled and number of legal crab harvested for each statistical area fished by the vessel on which the observer is placed and by any vessels delivering to the observer's station.
2. Obtain and record daily 100 length frequency samples of harvested legal male red king crab (carapace width $\geq 4\text{-}3/4$ inches), 100 length frequency samples of incidentally caught sublegal male red king crab, and at least 20 length frequency samples of incidentally caught female red king crab.
3. Determine the mean live weight of the harvested legal male crab.
4. Determine the carapace age of the sampled crab.
5. Determine the percentage of new recruits in the commercial harvest.
6. Determine the degree of ovigerity of sampled female red king crab.
7. Determine the percentage of illegal commercial harvest by sampling a minimum of 600 crab per delivery for legal size and sex.
8. Develop a relative abundance index for legal male, sublegal male and female king crab by recording the catch of as many pot lifts as is required to obtain a sample size of 300 or more crab per day.
9. Document bycatch species by number if possible (optional).

METHODS

The methods used during the 1993 commercial crab season for catch reporting, sampling crab, skipper interviews, and collecting information from tagged crab are presented in the ADF&G Shellfish Observer Field Manual and Addendum #1 to Observers Manual (found on the inside back cover of Observer Manual). This manual is available through the ADF&G commercial fishery office in Nome. The identity of vessels from which observer data was collected have been omitted from this report to maintain confidentiality.

The quality of the data collected by the single onboard observer during the 1993 commercial crab season was excellent. This season's data requirements differed

from previous years due to the nature of this year's small boat fishery. No catcher processors took part in the fishery. Only legal landings were sampled, therefore no length frequency samples for female red king crab could be obtained and very few sublegal male king crab were measured. Also, no pot lifts or bycatch information could be documented.

RESULTS

Harvest Summary

Catch reporting logs were kept by the observer on the processor and by skippers of catcher vessels for each statistical area fished. Verbal reports were relayed daily at 8:30 am to the ADF&G office in Nome. Vessels' compliance with daily verbal reports varied from boat to boat and were considered lax for the most part. Daily catch statistics can be found in Table 1 and Figure 3.

Fish ticket reports document that 9 statistical areas were fished (Table 2). Fifty-five percent of all pot lifts occurred in area 656402, 32% in area 656401, 8% in area 666330, 2% in area 646401, and 1% in area 666402. Less than 1% of all pot lifts occurred in areas 636401, 646402, 656330, and 666401. Area 656402 accounted for 58% of the total harvest, area 656401 for 31%, and area 666330 for 9%. Areas 636401, 646401, 646402, 656330, 666401, and 666402 each accounted for less than 1% of the total harvest.

Total pots pulled from individual statistical areas were: 3,920 pots in area 656402, 2,276 pots in area 656401, 545 pots in area 666330, 120 pots in area 646401, 87 pots in area 666402, 55 pots in area 636401, 26 pots in area 646402, 25 pots in area 656330, and 9 pots in area 666401 (Table 2). A total of 7,063 pots were pulled during the 1993 summer commercial crab season.

Total harvest for individual statistical areas were: 67,516 crab in area 656402, 35,711 crab in area 656401, 10,854 crab in area 666330, 653 crab in area 646401, 476 crab in area 636401, 230 crab in area 666402, 214 crab in area 646402, 174 crab in area 666401, and 85 crab in area 656330. The total commercial catch was 115,913 crab (Table 2). A total of 335,790 pounds were harvested.

Statistical area 666330 had the greatest CPUE with 19.9 crab/pot (Table 2). The CPUE for area 666401 was 19.3 crab/pot, 17.2 crab/pot in area 656402, 15.7 crab/pot in area 656401, 8.7 crab/pot in area 636401, 8.2 crab/pot in area 646402, 5.4 crab/pot in area 646401, 3.4 crab/pot in area 656330, and 2.6 crab/pot in area 666402. The overall CPUE for the 1993 summer commercial season was 16.4 crab/pot.

Average weights of crab from individual statistical areas were: 4.29 lbs./crab in area 666401, 3.41 lbs./crab in area 646402, 3.12 lbs./crab in area 656330, 3.01 lbs./crab in area 646401, 2.95 lbs./crab in area 656401, 2.93 lbs./crab in area 666330, 2.88 lbs./crab in area 636401, 2.86 lbs./crab in area 656402, and 2.33 lbs./crab in area 666402 (Table 2). The average weight for the 1993 commercial season was 2.9 lbs./crab.

A total of 31,725 crab were sampled for legal size and sex. Thirty-seven crab or 0.12%, were found to be illegal. The percent of illegal catch ranged from 0% to 1% of the harvest for individual vessels.

Legal Male King Crab

Carapace length, age, and crab weight were collected from 17,804 legal male red king crab in five statistical areas throughout the duration of the 1993 summer fishery. Carapace age was classified as new (11 months old) or old (at least 23 months old) (Table 3, Figure 4).

Overall mean carapace length of the legal male red king crab sampled was 119.1 mm (Table 3). The mean carapace length of sampled legal male crab for individual statistical areas were: 120.4 mm in area 656330, 119.8 mm in area 656401, 118.4 mm in area 656402, 121.4 mm in area 666330, and 120.9 mm in area 666401 (Tables 4, 5, 6, 7, 8).

Male crab with new shell carapace made up 90% of the total legal male king crab sampled, while old shell crab made up 10% of the sample (Table 3, Figure 4). New shell crab made up 90% of crab sampled in area 656330, 89% of crab sampled in area 656401, 91% of crab sampled in area 656402, 91% of crab sampled in area 666330, and 88% of crab sampled in area 666401 (Tables 4, 5, 6, 7, 8).

Recruit red king crab are defined as new shell, legal male king crab with a carapace length less than or equal to 115 mm. Recruit crab made up 31% of all legal male crab sampled (Table 3, 9). Post recruit crab made up 69% of the legal male crab sampled. The composition of recruit crab ranged from 20% to 36% for individual statistical areas sampled (Table 9).

The industry observer reported that some very new shell crab and a few double shell crab were being caught during the last week of the commercial fishery.

Sublegal (prerecruit) Male King Crab

Carapace length measurement and age was collected from 29 sublegal male red king crab (Table 10). The overall mean carapace length of the crab sampled was 97.3 mm. Twenty-eight of these crab were new shell, one was old shell.

Female King Crab

No female red king crab were sampled during the 1993 commercial fishery. Some vessel operators and crew reported seeing most females with "full" egg clutches and purple or "dark" in color. Some reported seeing a few small females with no eggs.

Bycatch

No bycatch information was collected during the 1993 commercial fishery.

Tags

Ten crab were found with tags during the 1993 commercial fishery (Table 11). One tag (NX 02,777) was turned in without any catch information. One tag (01,450) was reported found with catch information, but was never turned over to ADF&G personnel. Series number is unknown.

DISCUSSION

Harvest Summary

One processor vessel and 14 small catcher vessels took part in the 1993 summer commercial red king crab fishery in the Norton Sound Section. The total number of crab caught was 115,913, and the total number of pots pulled was 7,063. Total harvest was 335,790 pounds. The harvest goal was 340,000 pounds.

Fish ticket records show that this seasons largest fishing effort and greatest productivity occurred in statistical area 656402 (Table 2). Fifty-five percent of all pots pulled during the fishery occurred in area 656402, and 58% of the total harvest was taken in this area. In past commercial seasons, area 656402 has remained closed to fishing due to the fact it lies within closed waters (Figure 2). On July 15, 1993 the closure line was relaxed to 64° 20"N, allowing fishing in a portion of area 656402. The closed line was relaxed to allow an efficient harvest of crab. In the 1992 summer commercial fishery, area 656402 accounted for 47% of all pot pulls and 73% of the total harvest (Brennan, 1992). In the 1990 summer commercial fishery area 666401 accounted for 88% of all pot pulls and 91% of the total harvest (Gebhard, 1990). Comparisons of the annual summer commercial harvest of crab by statistical area can be found in Appendix Table 2.

Based on fish ticket data, statistical area 666330 had the greatest CPUE of 19.9 crab/pot (Table 2). Overall CPUE for the 1993 season was 16.4 crab/pot. This compares to the overall CPUE of 4.3 crab/pot in 1992 (Brennan, 1992).

Statistical area 666401 had the greatest average weight per crab of 4.29 pounds, according to fish ticket data (Table 2). Overall average weight for the 1993 season was 2.9 pounds. This compares to an average weight of 3.0 pounds in the 1992 season (Brennan, 1992), 3.9 pounds in 1990 (Gebhard, 1990), 3.1 pounds in 1989 (Gebhard and Lean, 1989), and 3.2 pounds in 1988 (Gebhard and Lean, 1988).

A total of 31,725 crab were sampled for legal size and sex throughout the duration of the 1993 commercial season. The percent of illegal crab ranged from 0% to 1% of the harvest. The illegal harvest was found to be 0.1% overall. This is well below the 3.0% limit citable by Fish and Wildlife Protection.

Legal Male King Crab

The overall mean carapace length of sampled legal male king crab during the 1993 season was 119.1 mm (Table 3). The sample size was 17,804 crab. Carapace size seems similar to data from previous years. Mean carapace length was 119.0 mm in 1988 (Gebhard and Lean, 1988), 119.8 mm in 1989 (Gebhard and Lean, 1989), 121.1 mm in 1990 (Gebhard, 1990), and 119.7 mm in 1992 (Brennan, 1992).

This seasons legal male new shell/old shell ratio was 90% new shell to 10% old shell. The 1992 legal male new shell/old shell ratio was 71% new shell and 29% old shell (Brennan, 1992). Legal male new shell/old shell ratio in 1990 was 83% new shell and 17% old shell (Gebhard, 1990). In 1989 this ratio was 71% new shell and 29% old shell (Gebhard and Lean, 1989).

Recruit king crab made up 31% of the harvested stock sampled during the 1993 commercial season (Table 3). Total post recruits made up 69% of the harvested stock. This compares to 1992, when 28% of the harvest were recruits, and 72% were post recruits (Appendix Table 3). In 1990 recruits made up 21% of the harvested stock and total post recruits made up 79%. In 1989 recruits comprised 23% of the harvested stock and postrecruits made up 77%. In 1988 recruits comprised 25% of the harvested stock, and post recruits made up 75%. The 1993 commercial season showed the highest recruitment of king crab since 1986. The high level of recruitment documented in 1993 was probably due in part to the relaxation of the closure line. This closed area serves to protect the sublegal crab population.

The industry observer reported that some very new shell crab and a few double shell crab were being caught by fishermen during the last week of the commercial fishery. The proportion of molting crab was very low. Past commercial seasons have rarely continued past mid August, so this problem has not been seen in previous years.

Sublegal (Prerecruit) Male King Crab

The sample size for sublegal male king crab was 29 crab (Table 10). This is due to the fact that only legal landings were sampled. Overall mean carapace length of those sampled was 97.3 mm. No comparisons to previous commercial seasons can be made due to the small sample size.

Female King Crab

No female red king crab were sampled during the 1993 commercial season. This is due to the fact that only legal landings were sampled. Reports made by skippers and crew members stated that they observed most females having "full" egg clutches with eggs purple or "dark" in color. There were some reports of a few small female crab with no eggs.

Bycatch

No bycatch information could be documented because the sole industry observer was stationed on a processing vessel.

COMMENTS ON SAMPLING EFFORTS

There was a change in character in 1993 summer commercial fishery compared to past years due to regulation changes effecting pot limits and opening dates and a regulation making Norton Sound a super exclusive registration area (This regulation was overturned in mid-July). No large vessels participated in this years fishing - the catcher fleet was made up of small vessels (less than 80 foot). Only one processor was on the grounds throughout the duration of the fishery. The fishery occurred over nearly two full months, a change from a season that usually lasts a few days to a week. For the first time a significant portion of the harvest passed through Nome with six fishermen selling a portion of their harvest locally. All this contributed to some problems in the sampling effort.

There were no catcher processors on the grounds during the 1993 season. Only deliveries made to the processor or port could be sampled. These deliveries consisted of primarily legal male crab. This year an ADF&G employee was not placed on a catcher vessel as has been the case in past seasons. This was due to the fact that most catcher vessels were in the 30 to 80 foot range, and this person was needed to perform port sampling. As a consequence, no observer was available to collect information on observed pot lifts, sublegal male and female length frequencies, catch rates of sublegal crab, and bycatch information. Sublegal male and female crab data is important in determining the future health of the crab population in Norton Sound.

Port sampling was done by the ADF&G sampler when the vessel did not deliver to the processor. This could be done only when she was informed of a delivery by the vessel operator or buyer. There were instances where vessel operators and buyers could not or did not contact ADF&G when they were delivering their catch to the port.

If the change in character of the fishery continues in years to come, it is important that these sampling problems be addressed. The ADF&G sampler could be sent out on a catcher vessel for a day or two every week to obtain data. Port delivery sampling needs to be strictly enforced and regulated to insure it actually gets done.

COMMENTS ON OBSERVER PROGRAM

This was the fourth season that an independent observer was placed on board a crab vessel during the summer commercial fishery in Norton Sound. The observer was given an orientation on June 30 to familiarize him with the information he

was required to collect. This contributed to the high quality of data that was collected through the duration of the fishery.

The observer was not always able to board the small vessels delivering to the processor and conduct skipper interviews. This was due to weather or high seas. When this occurred, he would conduct skipper interviews by shouting across the vessels or by using the radio. The observer made suggestions on changing some data collection forms. This included making more space on the radio report form for codes, and making spaces larger for recording information on length frequency forms. The observer also commented throughout the fishery that he was harassed at times by the first mate and processing foreman. There were some instances when he was not informed of vessels arriving to offload their product.

SUMMARY

The 1993 summer commercial king crab fishery harvested 335,790 pounds of crab. The allowable quota was 340,000 pounds of crab. This season's fishing effort was concentrated in statistical area 656402 and 656401. The greatest percent of legal crab was harvested in area 656402. This area is usually closed to commercial fishing during the summer season because it lies in closed waters. This year the closure line was relaxed to increase the efficiency of the king crab harvest. A total of 115,913 crab were harvested and 7,063 pots were pulled. The overall CPUE for the season was 16.4 crab/pot. Overall average weight was 2.9 pounds. Illegal harvest was 0.1%, well below the 3% guideline citable by Fish and Wildlife Protection. The onboard observer program is thought to contribute to this low level of illegal harvest.

The overall mean carapace length of sampled legal male crab during the 1993 season was 119.1 mm. The legal male new shell/old shell ratio was 90% new shell to 10% old shell. Recruit king crab made up 31% of the harvested stock. Post recruits made up 69% of the harvested stock. This represents an increase in recruitment from the past 5 summer commercial seasons. Due to the nature of this year's fishery, very few sublegal male crab and no female crab were sampled. This missing portion of data is important in determining the future health of the king crab stock in Norton Sound. If the new character of the Norton Sound red king crab fishery continues, methods should be implemented to ensure sufficient sublegal crab data is collected.

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Table 1. Daily catch (using fish ticket data) for the commercial king crab harvest, Norton Sound Section, Eastern Bering Sea, July 1 – August 28, 1993.

Date ^a	Permits	Landings	Number of Crab	Lbs of crab caught	Cumulative Total (lbs)	# pots pulled	Average Weight	CPUE	% recruit male crab ^b
7/9/93	3	3	809	2259	2259	200	2.79	4.0	46.2
7/10/93	2	2	536	1594	3853	140	2.97	3.8	21.0
7/11/93	3	3	527	1803	5456	139	3.04	3.8	29.4
7/12/93		No deliveries							30.5
7/13/93		No deliveries due to weather							
7/14/93	2	2	553	1550	7006	100	2.80	5.5	22.8
7/15/93	1	1	341	1093	8099	40	3.21	8.5	23.8
7/16/93	4	4	1470	4799	12898	217	3.26	6.8	33.2
7/17/93	5	6	1815	5076	17974	181	2.80	10.0	40.7
7/18/93	3	3	3380	10030	28004	120	2.97	28.2	50.2
7/19/93	6	6	5810	15708	43712	254	2.70	22.9	46.0
7/20/93	4	4	4421	11700	55412	160	2.65	27.6	52.8
7/21/93	7	7	4177	11108	66520	218	2.66	19.2	47.2
7/22/93	5	7	3516	10110	76630	166	2.88	21.2	46.2
7/23/93	4	6	2406	6891	83521	187	2.86	12.9	45.6
7/24/93	7	10	6355	18566	102087	313	2.92	20.3	35.8
7/25/93	5	7	1700	4677	106764	151	2.75	11.3	35.5
7/26/93	2	2	730	2055	108819	80	2.82	9.1	32.4
7/27/93	7	12	7922	22297	131116	313	2.81	25.3	42.6
7/28/93	5	5	4780	13400	144516	180	2.80	26.6	32.4
7/29/93	2	2	2330	6800	151316	80	2.92	29.1	26.4
7/30/93	7	17	4652	13702	165018	288	2.95	16.2	24.8
7/31/93	1	1	20	64	165082	8			36.8
8/1/93		No deliveries due to weather							
8/2/93	5	5	1840	5480	170562	175	2.98	10.5	21.3
8/3/93	7	7	3020	9469	180031	268	3.14	11.3	28.3
8/4/93	3	3	1142	3365	183396	120	2.95	9.5	39.0
8/5/93	4	6	1972	5561	188957	145	2.82	13.6	34.7
8/6/93	7	8	1683	5367	194324	281	3.19	6.0	42.0
8/7/93	3	3	765	2352	196676	120	3.07	6.4	59.7
8/8/93	5	6	5025	14710	211386	183	2.93	27.5	37.4
8/9/93	5	5	8650	24930	236316	245	2.88	35.3	18.5
8/10/93	5	6	3670	10970	247286	209	2.99	17.6	45.0
8/11/93	3	3	2700	8207	255493	127	3.04	21.3	27.4
8/12/93	6	6	3022	8593	264086	172	2.84	17.6	39.3
8/13/93	2	2	1100	3165	267251	80	2.88	13.8	25.1
8/14/93	1	1	2400	6712	273963	42	2.80	57.1	25.2
8/15/93	2	2	710	2050	276013	80	2.89	8.9	38.2
8/16/93	1	1	650	1945	277958	27	2.99	24.1	16.1
8/17/93	9	10	4136	12411	290369	339	3.00	12.2	32.1
8/18/93	2	2	799	2716	293085	49	3.40	16.3	15.2
8/19/93		No fishing due to weather							
8/20/93		No fishing due to weather							
8/21/93		No deliveries							9.4
8/22/93	5	5	3520	10997	304082	257	3.12	13.7	28.1
8/23/93	3	4	2661	7366	311448	120	2.77	22.2	25.7
8/24/93		No deliveries							
8/25/93	5	6	3313	9776	321224	172	2.95	19.3	20.7
8/26/93		No deliveries							
8/27/93	2	2	460	1390	322614	54	3.02	8.5	
8/28/93 ^c	4	5	4425	13176	335790	263	2.98	16.8	22
Totals:	20	208	115913	335790		7063	2.9	16.4	31.3

^a Fishery opened by regulation July 1.

^b % recruit taken from observers daily report.

^c Fishery closed 8/28 at 12 noon by emergency order.

Table 2. Red king crab summer commercial catch total (from fish ticket reports) by statistical area for Norton Sound Section, Eastern Bering Sea, July 1 – August 28, 1993.

Statistical Area	Number	Pounds	Pots	CPUE	Average Weight (Lbs.)	Percent pots pulled in stat. area (%)	Percent harvest in stat. area (%)
636401	476	1,373	55	8.7	2.88	0.8	0.4
646401	653	1,963	120	5.4	3.01	1.7	0.6
646402	214	730	26	8.2	3.41	0.4	0.2
656330	85	265	25	3.4	3.12	0.4	0.1
656401	35,711	105,341	2,276	15.7	2.95	32.2	30.8
656402	67,516	193,079	3,920	17.2	2.86	55.5	58.2
666330	10,854	31,758	545	19.9	2.93	7.7	9.4
666401	174	746	9	19.3	4.29	0.1	0.2
666402	230	535	87	2.6	2.33	1.2	0.2
Total	115,913	335,790	7,063	16.4	2.9	100	100

Figure 3. Carapace length measurement summary of sampled legal male red king crab captured during the commercial king crab harvest, Norton Sound Section, Eastern Bering Sea, July 1 - August 26, 1993

Carapace Length (mm)	New shell			Old shell			Total		
	No.	Ave Length	%	No.	Ave Length	%	No.	Ave Length	%
98		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
99	1	0.01	0.0%		0.00	0.0%	1	0.01	0.0%
100	5	0.03	0.0%		0.00	0.0%	5	0.03	0.0%
101	31	0.19	0.2%		0.00	0.0%	31	0.18	0.2%
102	82	0.52	0.5%	3	0.18	0.2%	85	0.49	0.5%
103	134	0.86	0.8%	4	0.24	0.2%	138	0.80	0.8%
104	207	1.34	1.3%	9	0.54	0.5%	216	1.28	1.2%
105	259	1.76	1.7%	11	0.66	0.6%	280	1.65	1.6%
106	298	1.97	1.9%	18	1.10	1.0%	316	1.88	1.8%
107	379	2.52	2.4%	21	1.29	1.2%	400	2.40	2.2%
108	446	3.00	2.8%	31	1.93	1.8%	477	2.89	2.7%
109	416	2.82	2.6%	32	2.01	1.8%	448	2.74	2.5%
110	483	3.31	3.0%	40	2.53	2.3%	523	3.23	2.9%
111	493	3.41	3.1%	46	2.94	2.6%	539	3.36	3.0%
112	545	3.84	3.5%	55	3.54	3.2%	600	3.90	3.5%
113	590	3.94	3.5%	45	2.93	2.6%	635	3.84	3.4%
114	610	4.33	3.6%	63	4.13	3.6%	673	4.31	3.8%
115	637	4.68	4.0%	57	3.77	3.3%	694	4.48	3.9%
116	728	5.26	4.5%	77	5.14	4.4%	805	5.24	4.5%
117	741	5.40	4.6%	74	4.98	4.3%	815	5.38	4.6%
118	736	5.41	4.6%	82	5.57	4.7%	818	5.42	4.6%
119	721	5.34	4.5%	86	5.89	4.9%	807	5.39	4.5%
120	712	5.32	4.4%	68	4.70	3.9%	780	5.26	4.4%
121	685	6.18	4.3%	82	5.71	4.7%	767	5.21	4.3%
122	806	6.12	5.0%	107	7.51	6.2%	913	6.28	5.1%
123	837	4.88	4.0%	82	5.80	4.7%	719	4.97	4.0%
124	655	5.06	4.1%	70	4.99	4.0%	725	5.05	4.1%
125	553	4.30	3.4%	84	4.60	3.7%	617	4.33	3.5%
126	524	4.11	3.3%	68	4.93	3.9%	592	4.19	3.3%
127	442	3.49	2.6%	66	4.82	3.8%	508	3.62	2.9%
128	439	3.50	2.7%	44	3.24	2.5%	483	3.47	2.7%
129	352	2.83	2.2%	49	3.64	2.8%	401	2.91	2.3%
130	319	2.58	2.0%	39	2.92	2.2%	358	2.61	2.0%
131	413	3.37	2.6%	43	3.24	2.5%	456	3.36	2.6%
132	241	1.98	1.5%	43	3.27	2.5%	284	2.11	1.6%
133	157	1.30	1.0%	26	1.99	1.5%	183	1.37	1.0%
134	109	0.91	0.7%	18	1.39	1.0%	127	0.98	0.7%
135	93	0.78	0.6%	20	1.55	1.2%	113	0.88	0.6%
136	88	0.73	0.6%	24	1.88	1.4%	110	0.84	0.6%
137	77	0.68	0.5%	14	1.10	0.8%	91	0.70	0.6%
138	61	0.62	0.4%	10	0.79	0.6%	71	0.55	0.4%
139	37	0.32	0.2%	3	0.24	0.2%	40	0.31	0.2%
140	37	0.32	0.2%	5	0.40	0.3%	42	0.33	0.2%
141	31	0.27	0.2%	11	0.89	0.6%	42	0.33	0.2%
142	23	0.20	0.1%	8	0.85	0.5%	31	0.25	0.2%
143	12	0.11	0.1%	6	0.49	0.3%	18	0.14	0.1%
144	6	0.05	0.0%	5	0.41	0.3%	11	0.09	0.1%
145	6	0.05	0.0%	2	0.17	0.1%	7	0.06	0.0%
146	2	0.02	0.0%	2	0.17	0.1%	4	0.03	0.0%
147		0.00	0.0%	1	0.08	0.1%	1	0.01	0.0%
148	1	0.01	0.0%		0.00	0.0%	1	0.01	0.0%
149	1	0.01	0.0%	1	0.09	0.1%	2	0.02	0.0%
150	1	0.01	0.0%		0.00	0.0%	1	0.01	0.0%
151	1	0.01	0.0%	1	0.09	0.1%	2	0.02	0.0%
152		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
153	1	0.01	0.0%	1	0.09	0.1%	2	0.02	0.0%
154	1	0.01	0.0%		0.00	0.0%	1	0.01	0.0%
155	1	0.01	0.0%		0.00	0.0%	1	0.01	0.0%
156		0.00	0.0%	1	0.09	0.1%	1	0.01	0.0%
157		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
158		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
159	1	0.01	0.0%		0.00	0.0%	1	0.01	0.0%
160		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
161		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
162	1	0.01	0.0%		0.00	0.0%	1	0.01	0.0%
163		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
164	1	0.01	0.0%		0.00	0.0%	1	0.01	0.0%
165		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
170		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
171		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
Total No.	16,066		90.2%	1,738		9.8%	17,804		100.0%
Mean		116.9			121.3			119.1	
Total legal			17,804						
Total Recruits			5,616						
Percent			31.5%						
Total Post Recruits			12,188						
Percent			68.5%						

Table 4. Carapace length measurement summary of sampled legal male red king crab captured in statistical area 656330 during the commercial king crab harvest, Norton Sound Section, Eastern Bering Sea, July 1 – August 28, 1993.

Carapace Length (mm)	New shell			Old shell			Total		
	No.	Ave Length Calc.	%	No.	Ave Length Calc.	%	No.	Ave Length Calc.	%
98		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
99		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
100		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
101		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
102	1	1.12	1.1%		0.00	0.0%	1	1.01	1.0%
103	1	1.13	1.1%		0.00	0.0%	1	1.02	1.0%
104		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
105	1	1.15	1.1%		0.00	0.0%	1	1.04	1.0%
106	1	1.16	1.1%		0.00	0.0%	1	1.05	1.0%
107	1	1.18	1.1%		0.00	0.0%	1	1.08	1.0%
108	2	2.37	2.2%	1	10.80	10.0%	3	3.21	3.0%
109		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
110	1	1.21	1.1%		0.00	0.0%	1	1.09	1.0%
111	6	7.32	6.8%		0.00	0.0%	6	6.59	5.9%
112	1	1.23	1.1%		0.00	0.0%	1	1.11	1.0%
113	3	3.73	3.3%	1	11.30	10.0%	4	4.48	4.0%
114	1	1.25	1.1%		0.00	0.0%	1	1.13	1.0%
115	1	1.26	1.1%		0.00	0.0%	1	1.14	1.0%
116	7	6.92	7.7%		0.00	0.0%	7	6.04	5.9%
117	6	7.71	6.8%	2	23.40	20.0%	8	9.27	7.9%
118	5	6.48	5.5%		0.00	0.0%	5	5.84	5.0%
119	5	6.54	5.5%	1	11.90	10.0%	6	7.07	5.9%
120	3	3.96	3.3%	1	12.00	10.0%	4	4.75	4.0%
121	6	7.98	6.6%		0.00	0.0%	6	7.19	5.9%
122	5	6.70	5.5%	1	12.20	10.0%	6	7.25	5.9%
123	3	4.05	3.3%		0.00	0.0%	3	3.65	3.0%
124	5	6.81	5.5%		0.00	0.0%	5	6.14	5.0%
125	3	4.12	3.3%	1	12.50	10.0%	4	4.95	4.0%
126	3	4.15	3.3%	1	12.60	10.0%	4	4.99	4.0%
127	5	6.98	5.5%		0.00	0.0%	5	6.29	5.0%
128	1	1.41	1.1%		0.00	0.0%	1	1.27	1.0%
129	2	2.84	2.2%		0.00	0.0%	2	2.55	2.0%
130	4	5.71	4.4%		0.00	0.0%	4	5.15	4.0%
131		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
132	2	2.90	2.2%		0.00	0.0%	2	2.61	2.0%
133	1	1.48	1.1%	1	13.30	10.0%	2	2.63	2.0%
134		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
135	1	1.48	1.1%		0.00	0.0%	1	1.34	1.0%
136		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
137	1	1.51	1.1%		0.00	0.0%	1	1.38	1.0%
138		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
139	1	1.53	1.1%		0.00	0.0%	1	1.38	1.0%
140		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
141		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
142	1	1.56	1.1%		0.00	0.0%	1	1.41	1.0%
143		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
144		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
145	1	1.59	1.1%		0.00	0.0%	1	1.44	1.0%
146		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
147		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
148		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
149		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
150		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
151		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
152		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
153		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
154		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
155		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
156		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
157		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
158		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
159		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
160		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
161		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
162		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
163		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
164		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
165		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
Total No.	91	90.1%		10	9.9%		101	100.0%	
Mean		120.5			120			120.4	
Total legal			101						
Total Recruits			20						
Percent			19.8%						
Total Post Recruits			81						
Percent			80.2%						

Table 5. Carapace length measurement summary of sampled legal male red king crab captured in statistical area 656401 during the commercial king crab harvest, Norton Sound Section, Eastern Bering Sea, July 1 - August 28, 1993.

Carapace Length (mm)	New shell			Old shell			Total		
	No.	Ave Length Calc.	%	No.	Ave Length Calc.	%	No.	Ave Length Calc.	%
98		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
99		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
100	1	0.02	0.0%		0.00	0.0%	1	0.02	0.0%
101	7	0.16	0.2%		0.00	0.0%	7	0.14	0.1%
102	14	0.33	0.3%		0.00	0.0%	14	0.29	0.3%
103	20	0.47	0.5%		0.00	0.0%	20	0.42	0.4%
104	39	0.93	0.9%	3	0.59	0.6%	42	0.89	0.9%
105	62	1.49	1.4%	2	0.40	0.4%	64	1.37	1.3%
106	62	1.50	1.4%	5	1.01	1.0%	67	1.45	1.4%
107	78	1.91	1.8%	9	1.83	1.7%	87	1.90	1.8%
108	87	2.15	2.0%	7	1.44	1.3%	94	2.08	1.9%
109	96	2.40	2.2%	9	1.87	1.7%	105	2.34	2.1%
110	126	3.17	2.9%	10	2.10	1.9%	136	3.06	2.8%
111	117	2.97	2.7%	14	2.96	2.7%	131	2.97	2.7%
112	143	3.07	3.3%	16	3.41	3.0%	159	3.64	3.3%
113	150	3.88	3.4%	14	3.01	2.7%	164	3.79	3.4%
114	151	3.94	3.5%	16	3.47	3.0%	167	3.89	3.4%
115	148	3.90	3.4%	21	4.60	4.0%	169	3.97	3.6%
116	189	5.02	4.3%	26	5.74	5.0%	215	5.10	4.4%
117	197	5.28	4.5%	30	6.09	5.7%	227	5.43	4.6%
118	224	6.05	5.1%	26	5.84	5.0%	250	6.03	5.1%
119	205	5.59	4.7%	32	7.25	6.1%	237	5.77	4.8%
120	210	5.77	4.8%	20	4.57	3.8%	230	5.64	4.7%
121	212	5.87	4.9%	25	5.76	4.8%	237	5.86	4.8%
122	243	6.79	5.6%	38	8.83	7.2%	281	7.01	5.7%
123	203	5.72	4.6%	20	4.89	3.8%	223	5.61	4.6%
124	201	5.71	4.6%	20	4.72	3.6%	221	5.60	4.5%
125	165	4.72	3.8%	18	3.81	3.0%	181	4.82	3.7%
126	177	5.11	4.1%	17	4.08	3.2%	194	5.00	4.0%
127	133	3.87	3.0%	19	4.60	3.6%	152	3.95	3.1%
128	143	4.19	3.3%	12	2.93	2.3%	155	4.06	3.2%
129	108	3.19	2.5%	12	2.95	2.3%	120	3.16	2.5%
130	90	2.68	2.1%	12	2.97	2.3%	102	2.71	2.1%
131	77	2.31	1.8%	17	4.24	3.2%	94	2.52	1.9%
132	78	2.36	1.8%	13	3.27	2.5%	91	2.46	1.9%
133	47	1.43	1.1%	7	1.77	1.3%	54	1.47	1.1%
134	33	1.01	0.8%	6	1.53	1.1%	39	1.07	0.8%
135	27	0.83	0.6%	9	2.31	1.7%	36	0.99	0.7%
136	13	0.40	0.3%	3	0.78	0.6%	16	0.44	0.3%
137	18	0.56	0.4%	3	0.78	0.6%	21	0.59	0.4%
138	26	0.82	0.6%		0.00	0.0%	26	0.73	0.5%
139	5	0.18	0.1%		0.00	0.0%	5	0.14	0.1%
140	11	0.35	0.3%	4	1.07	0.8%	15	0.43	0.3%
141	6	0.19	0.1%	2	0.54	0.4%	8	0.23	0.2%
142	11	0.36	0.3%	2	0.54	0.4%	13	0.38	0.3%
143	3	0.10	0.1%	3	0.82	0.6%	6	0.18	0.1%
144	3	0.10	0.1%	2	0.55	0.4%	5	0.15	0.1%
145	2	0.07	0.0%		0.00	0.0%	2	0.06	0.0%
146	2	0.07	0.0%	1	0.28	0.2%	3	0.09	0.1%
147		0.00	0.0%	1	0.28	0.2%	1	0.03	0.0%
148	1	0.03	0.0%		0.00	0.0%	1	0.03	0.0%
149		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
150		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
151		0.00	0.0%	1	0.29	0.2%	1	0.03	0.0%
152		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
153		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
154		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
155	1	0.04	0.0%		0.00	0.0%	1	0.03	0.0%
156		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
157		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
158		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
159		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
160		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
161		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
162	1	0.04	0.0%		0.00	0.0%	1	0.03	0.0%
163		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
164	1	0.04	0.0%		0.00	0.0%	1	0.03	0.0%
165		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
Total No.	4,367		89.3%	525		10.7%	4,892		100.0%
Mean		119.7			121.1			119.8	
Total Legals			4,892						
Total Recruits			1,301						
Percent			26.6%						
Total Post Recruits			3,591						
Percent			73.4%						

Table 5. Carapace length measurement summary of sampled legal male red king crab captured in statistical area 056402 during the commercial king crab harvest, Norton Sound Section, Eastern Bering Sea, July 1 – August 28, 1993.

Carapace Length (mm)	New shell			Old shell			Total		
	No.	Ave Length Calc.	%	No.	Ave Length Calc.	%	No.	Ave Length Calc.	%
98		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
99	1	0.01	0.0%		0.00	0.0%	1	0.01	0.0%
100	4	0.04	0.0%		0.00	0.0%	4	0.04	0.0%
101	23	0.24	0.2%		0.00	0.0%	23	0.21	0.2%
102	59	0.61	0.6%	3	0.31	0.3%	62	0.58	0.6%
103	100	1.05	1.0%	3	0.31	0.3%	103	0.98	0.9%
104	141	1.49	1.4%	8	0.82	0.8%	147	1.41	1.4%
105	186	1.98	1.9%	7	0.73	0.7%	193	1.87	1.8%
106	220	2.37	2.2%	12	1.27	1.2%	232	2.27	2.1%
107	272	2.96	2.8%	10	1.07	1.0%	282	2.78	2.6%
108	335	3.58	3.4%	21	2.26	2.1%	356	3.55	3.3%
109	283	3.13	2.9%	21	2.28	2.1%	304	3.06	2.8%
110	318	3.55	3.2%	27	2.96	2.7%	345	3.50	3.2%
111	338	3.81	3.4%	29	3.21	2.9%	367	3.76	3.4%
112	373	4.25	3.8%	36	3.91	3.5%	409	4.21	3.8%
113	369	4.24	3.7%	27	3.04	2.7%	396	4.13	3.7%
114	404	4.68	4.1%	34	3.87	3.4%	438	4.60	4.0%
115	450	5.26	4.6%	30	3.44	3.0%	480	5.09	4.4%
116	457	5.39	4.6%	41	4.76	4.1%	498	5.33	4.6%
117	458	5.45	4.7%	40	4.67	4.0%	498	5.37	4.6%
118	427	5.12	4.3%	48	5.65	4.8%	475	5.17	4.4%
119	422	5.10	4.3%	42	4.99	4.2%	464	5.09	4.3%
120	412	5.02	4.2%	42	5.03	4.2%	454	5.02	4.2%
121	402	4.94	4.1%	50	6.04	5.0%	452	5.04	4.2%
122	470	5.83	4.8%	57	6.94	5.7%	527	5.93	4.9%
123	340	4.25	3.5%	51	6.26	5.1%	391	4.44	3.6%
124	372	4.69	3.8%	40	4.95	4.0%	412	4.71	3.8%
125	307	3.90	3.1%	36	4.49	3.6%	343	3.95	3.2%
126	265	3.39	2.7%	41	5.16	4.1%	306	3.56	2.8%
127	238	3.07	2.4%	41	5.20	4.1%	279	3.27	2.6%
128	238	3.10	2.4%	24	3.07	2.4%	262	3.09	2.4%
129	175	2.29	1.8%	31	3.99	3.1%	206	2.45	1.9%
130	170	2.25	1.7%	20	2.59	2.0%	190	2.28	1.8%
131	303	4.03	3.1%	22	2.88	2.2%	325	3.93	3.0%
132	121	1.62	1.2%	22	2.90	2.2%	143	1.74	1.3%
133	85	1.15	0.9%	14	1.86	1.4%	99	1.21	0.9%
134	58	0.78	0.6%	8	1.07	0.8%	64	0.79	0.6%
135	45	0.62	0.5%	8	1.08	0.8%	53	0.66	0.5%
136	56	0.77	0.6%	18	2.17	1.6%	72	0.90	0.7%
137	40	0.56	0.4%	9	1.23	0.9%	49	0.62	0.5%
138	23	0.32	0.2%	8	1.10	0.8%	31	0.39	0.3%
139	19	0.27	0.2%	3	0.42	0.3%	22	0.28	0.2%
140	18	0.26	0.2%		0.00	0.0%	18	0.23	0.2%
141	20	0.29	0.2%	9	1.27	0.9%	29	0.38	0.3%
142	9	0.13	0.1%	5	0.71	0.5%	14	0.18	0.1%
143	7	0.10	0.1%	3	0.43	0.3%	10	0.13	0.1%
144	3	0.04	0.0%	3	0.43	0.3%	6	0.08	0.1%
145	2	0.03	0.0%	2	0.29	0.2%	4	0.05	0.0%
146		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
147		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
148		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
149	1	0.02	0.0%	1	0.15	0.1%	2	0.03	0.0%
150		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
151	1	0.02	0.0%		0.00	0.0%	1	0.01	0.0%
152		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
153	1	0.02	0.0%		0.00	0.0%	1	0.01	0.0%
154	1	0.02	0.0%		0.00	0.0%	1	0.01	0.0%
155		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
156		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
157		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
158		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
159	1	0.02	0.0%		0.00	0.0%	1	0.01	0.0%
160		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
161		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
162		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
163		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
164		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
165		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
Total No.	9,841		90.8%	1,002		9.2%	10,843		100.0%
Mean		118.2			121.0			118.4	
Total legal			10,843						
Total Recruits			3,876						
Percent			35.7%						
Total Post Recruits			6,967						
Percent			64.3%						

Table 7. Carapace length measurement summary of sampled legal male red king crab captured in statistical area 656330 during the commercial king crab harvest, Norton Sound Section, Eastern Bering Sea, July 1 – August 28, 1993.

Carapace Length (mm)	New shell			Old shell			Total		
	No.	Ave Length Calc.	%	No.	Ave Length Calc.	%	No.	Ave Length Calc.	%
98		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
99		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
100		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
101	1	0.08	0.1%		0.00	0.0%	1	0.08	0.1%
102	5	0.42	0.4%		0.00	0.0%	5	0.38	0.4%
103	9	0.76	0.7%	1	0.82	0.8%	10	0.77	0.7%
104	19	1.62	1.6%		0.00	0.0%	19	1.47	1.4%
105	11	0.95	0.9%		0.00	0.0%	11	0.86	0.8%
106	7	0.61	0.6%	1	0.85	0.8%	8	0.63	0.6%
107	18	1.58	1.5%	1	0.86	0.8%	19	1.51	1.4%
108	12	1.06	1.0%	2	1.73	1.6%	14	1.13	1.0%
109	30	2.69	2.5%	2	1.74	1.6%	32	2.60	2.4%
110	24	2.17	2.0%	2	1.76	1.6%	26	2.13	1.9%
111	18	1.64	1.5%	3	2.66	2.4%	21	1.74	1.6%
112	30	2.76	2.5%	3	2.69	2.4%	33	2.75	2.5%
113	27	2.51	2.2%	2	1.81	1.6%	29	2.44	2.2%
114	37	3.47	3.0%	7	5.38	5.6%	44	3.74	3.3%
115	24	2.27	2.0%	2	1.84	1.6%	26	2.23	1.9%
116	52	4.96	4.3%	6	5.57	4.8%	58	5.01	4.3%
117	53	5.10	4.4%		0.00	0.0%	53	4.62	3.9%
118	54	5.24	4.4%	7	6.61	5.6%	61	5.36	4.5%
119	63	6.16	5.2%	5	4.76	4.0%	68	6.03	5.1%
120	68	6.71	5.6%	4	3.84	3.2%	72	6.44	5.4%
121	39	3.88	3.2%	4	3.87	3.2%	43	3.89	3.2%
122	63	6.32	5.2%	9	8.78	7.2%	72	6.55	5.4%
123	71	7.18	5.8%	7	6.80	5.6%	78	7.15	5.8%
124	49	4.99	4.0%	7	6.94	5.6%	66	5.17	4.2%
125	57	5.85	4.7%	6	6.00	4.8%	63	5.87	4.7%
126	81	6.32	5.0%	5	5.04	4.0%	86	6.20	4.9%
127	50	5.22	4.1%	4	4.06	3.2%	54	5.11	4.0%
128	39	4.10	3.2%	2	2.05	1.6%	41	3.91	3.1%
129	47	4.98	3.9%	5	5.16	4.0%	52	5.00	3.9%
130	40	4.27	3.3%	5	5.20	4.0%	45	4.36	3.4%
131	24	2.58	2.0%	2	2.10	1.6%	26	2.54	1.9%
132	22	2.36	1.8%	6	6.34	4.8%	28	2.75	2.1%
133	15	1.64	1.2%	2	2.13	1.6%	17	1.68	1.3%
134	12	1.32	1.0%	4	4.29	3.2%	16	1.60	1.2%
135	16	1.66	1.2%	2	2.16	1.6%	17	1.71	1.3%
136	10	1.12	0.8%	2	2.18	1.6%	12	1.22	0.9%
137	11	1.24	0.9%	1	1.10	0.8%	12	1.23	0.9%
138	8	0.91	0.7%		0.00	0.0%	8	0.82	0.6%
139	9	1.03	0.7%		0.00	0.0%	9	0.93	0.7%
140	4	0.46	0.3%		0.00	0.0%	4	0.42	0.3%
141	4	0.46	0.3%		0.00	0.0%	4	0.42	0.3%
142	2	0.23	0.2%	1	1.14	0.8%	3	0.32	0.2%
143	2	0.24	0.2%		0.00	0.0%	2	0.21	0.1%
144		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
145		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
146		0.00	0.0%	1	1.17	0.8%	1	0.11	0.1%
147		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
148		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
149		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
150	1	0.12	0.1%		0.00	0.0%	1	0.11	0.1%
151		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
152		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
153		0.00	0.0%	1	1.22	0.8%	1	0.11	0.1%
154		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
155		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
156		0.00	0.0%	1	1.25	0.8%	1	0.12	0.1%
157		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
158		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
159		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
160		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
161		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
162		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
163		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
164		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
165		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
Total No.	1,217		90.7%	125		9.3%	1,342		100.0%
Mean		121.3			122.9			121.4	
Total legal			1,342						
Total Recruits			272						
Percent			20.3%						
Total Post Recruits			1,070						
Percent			79.7%						

Table 8. Carapace length measurement summary of sampled legal male red king crab captured in statistical area 866401 during the commercial king crab harvest, Norton Sound Section, Eastern Bering Sea, July 1 - August 28, 1993.

Carapace Length (mm)	New shell			Old shell			Total		
	No.	Ave Length Calc.	%	No.	Ave Length Calc.	%	No.	Ave Length Calc.	%
98		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
99		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
100		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
101		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
102	3	0.56	0.5%		0.00	0.0%	3	0.49	0.5%
103	4	0.75	0.7%		0.00	0.0%	4	0.66	0.6%
104	8	1.51	1.5%		0.00	0.0%	8	1.33	1.3%
105	9	1.72	1.8%	2	2.78	2.6%	11	1.85	1.8%
106	8	1.54	1.5%		0.00	0.0%	8	1.35	1.3%
107	10	1.95	1.8%	1	1.41	1.3%	11	1.88	1.8%
108	10	1.98	1.8%		0.00	0.0%	10	1.73	1.6%
109	7	1.39	1.3%		0.00	0.0%	7	1.22	1.1%
110	14	2.60	2.5%	1	1.45	1.3%	15	2.64	2.4%
111	14	2.83	2.5%		0.00	0.0%	14	2.48	2.2%
112	18	3.67	3.3%	1	1.47	1.3%	19	3.40	3.0%
113	11	2.20	2.0%	1	1.49	1.3%	12	2.17	1.9%
114	17	3.52	3.1%	8	9.00	7.9%	23	4.19	3.7%
115	14	2.93	2.5%	4	8.05	5.3%	18	3.31	2.9%
116	23	4.85	4.2%	4	6.11	5.3%	27	5.00	4.3%
117	27	5.74	4.9%	2	3.08	2.8%	29	5.42	4.6%
118	26	5.58	4.7%	1	1.55	1.3%	27	5.09	4.3%
119	26	5.83	4.7%	6	9.39	7.9%	32	6.08	5.1%
120	19	4.15	3.5%	1	1.68	1.3%	20	3.89	3.2%
121	26	5.72	4.7%	3	4.78	3.9%	29	5.61	4.8%
122	25	5.55	4.5%	2	3.21	2.6%	27	5.26	4.3%
123	20	4.47	3.8%	4	6.47	5.3%	24	4.72	3.8%
124	28	6.31	5.1%	3	4.89	3.9%	31	6.14	5.0%
125	21	4.77	3.8%	5	6.22	6.6%	26	5.19	4.2%
126	18	4.12	3.3%	4	6.83	5.3%	22	4.43	3.5%
127	18	3.89	2.9%	2	3.34	2.6%	18	3.65	2.9%
128	18	4.19	3.3%	6	10.11	7.9%	24	4.91	3.8%
129	20	4.69	3.8%	1	1.70	1.3%	21	4.33	3.4%
130	15	3.55	2.7%	2	3.42	2.6%	17	3.53	2.7%
131	9	2.14	1.6%	2	3.45	2.6%	11	2.30	1.8%
132	18	4.32	3.3%	2	3.47	2.6%	20	4.22	3.2%
133	9	2.18	1.6%	2	3.50	2.6%	11	2.34	1.8%
134	8	1.95	1.5%		0.00	0.0%	8	1.71	1.3%
135	5	1.23	0.9%	1	1.78	1.3%	6	1.29	1.0%
136	7	1.73	1.3%	3	5.37	3.9%	10	2.17	1.6%
137	7	1.74	1.3%	1	1.80	1.3%	8	1.75	1.3%
138	4	1.00	0.7%	2	3.63	2.6%	6	1.32	1.0%
139	3	0.76	0.5%		0.00	0.0%	3	0.67	0.5%
140	4	1.02	0.7%	1	1.84	1.3%	5	1.12	0.8%
141	1	0.28	0.2%		0.00	0.0%	1	0.23	0.2%
142		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
143		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
144		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
145		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
146		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
147		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
148		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
149		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
150		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
151		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
152		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
153		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
154		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
155		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
156		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
157		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
158		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
159		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
160		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
161		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
162		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
163		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
164		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
165		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
Total No.	550		87.9%	78		12.1%	528		100.0%
Mean		120.7			122.9			120.9	
Total legal			628						
Total Recruits			147						
Percent			23.5%						
Total Post Recruits			479						
Percent			76.5%						

Table 9. Percent of newly recruited male king crab sampled by statistical area
Norton Sound Section, Eastern Bering Sea, July 1 – August 28, 1993.

Statistical Area	Number of Crab Measured	Number of Recruit Crab Measured	%Recruits
656330	101	20	19.8
656401	4,892	1,301	26.6
656402	10,843	3,876	35.7
666330	1,342	272	20.3
666401	626	147	23.5
Total	17,804	5,616	31.3%

Table 10. Carapace length measurement summary of sampled sublegal male red king crab captured during the commercial king crab harvest, Norton Sound Section, Eastern Bering Sea, July 1 - August 28, 1993.

Carapace Length (mm)	New Shell			Old Shell			Total		
	No.	Ave Length	%	No.	Ave Length	%	No.	Ave Length	%
52		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
55		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
57		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
58		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
59		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
60		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
61		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
62		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
63		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
64		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
65		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
66		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
67		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
68		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
69		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
70		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
71		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
72		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
73		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
74		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
75		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
76		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
77		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
78		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
79		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
80		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
81		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
82		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
83		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
84		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
85		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
86		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
87		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
88		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
89		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
90		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
91	1	3.25	3.6%		0.00	0.0%	1	3.14	3.4%
92	2	6.57	7.1%		0.00	0.0%	2	6.34	6.9%
93		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
94	1	3.36	3.6%	1	94.00	100.0%	2	8.48	8.9%
95	1	3.39	3.6%		0.00	0.0%	1	3.28	3.4%
96	1	3.43	3.6%		0.00	0.0%	1	3.31	3.4%
97	7	24.25	25.0%		0.00	0.0%	7	23.41	24.1%
98	4	14.00	14.3%		0.00	0.0%	4	13.52	13.8%
99	6	21.21	21.4%		0.00	0.0%	6	20.48	20.7%
100	3	10.71	10.7%		0.00	0.0%	3	10.34	10.3%
101	1	3.81	3.6%		0.00	0.0%	1	3.48	3.4%
102	1	3.84	3.6%		0.00	0.0%	1	3.52	3.4%
103		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
104		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
105		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
106		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
107		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
108		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
109		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
110		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
111		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
112		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
113		0.00	0.0%		0.00	0.0%	0	0.00	0.0%
sum	28		96.6%	1		3.4%	29		100.0%
Mean		97.4			94.0			97.3	

Total sublegals 29

Table 11. Red king crab tag information recovered during the commercial king crab harvest, Norton Sound Section, Eastern Bering Sea, July 1 – August 28, 1993.

Tag #	Capture Date	Stat. Area Caught	Depth (f)	Carapace Length (mm)	Tagging Date	Carapace Length (mm)
NX 02,549	7/19	656401	11	128	4/2/91	106
NX 02,533	7/19	656401	11	121	4/2/91	104
SE 3345	7/20	656401	10	124	3/6/90	97
NX 02,497	7/23	656401	11	119	3/18/91	95
NX 02,566	7/24	656401	10	120	4/2/91	98
01,450 ^a	7/29	666401	11	142		
NW 01,378	7/30	656401	10	132	2/14/90	114
NX 02,310	7/30	656401	10	120	3/5/91	107
NX 02,654	8/3	656401	11	103	4/8/91	100
NX 02,777 ^b					4/23/91	91

^a Tag information reported, no tag recovered.

^b Tag turned in with no catch information

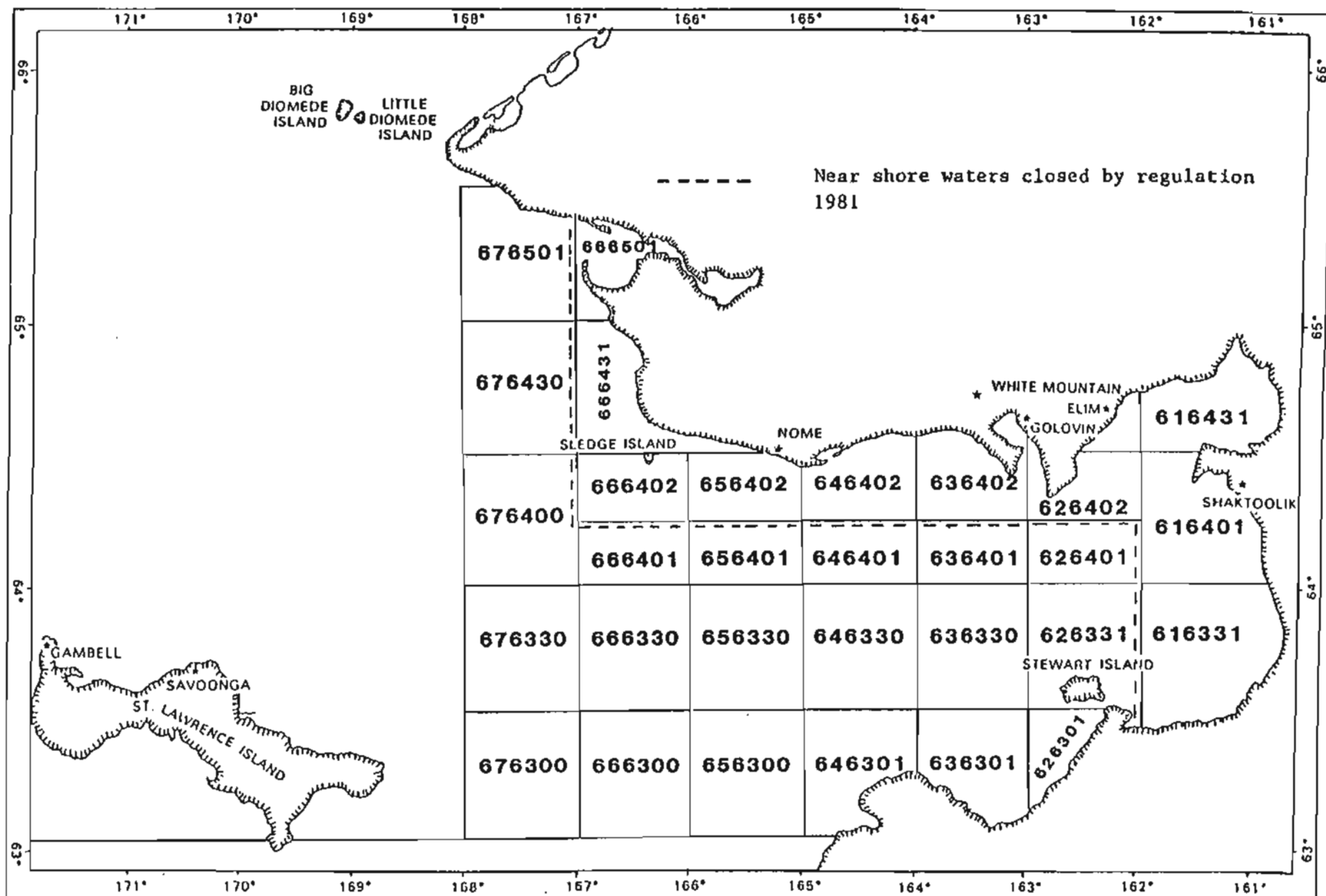


Figure 2. Statistical areas for the Norton Sound red king crab fishery.

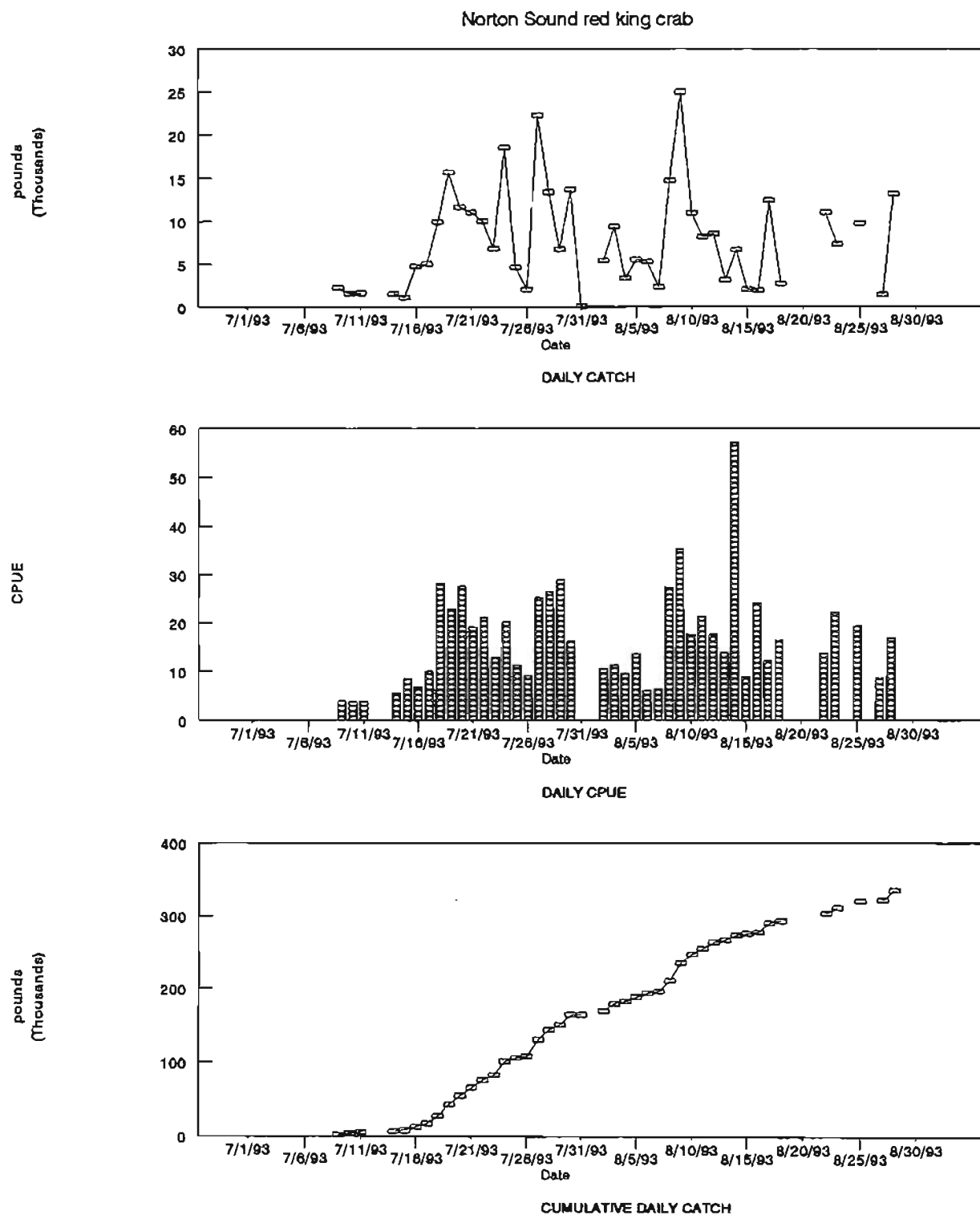


Figure 3. Daily catch, daily CPUE, and cumulative daily catch, Norton Sound Summer Commercial red king crab fishery, July 1 – August 18, 1993.

Legal male red king crab

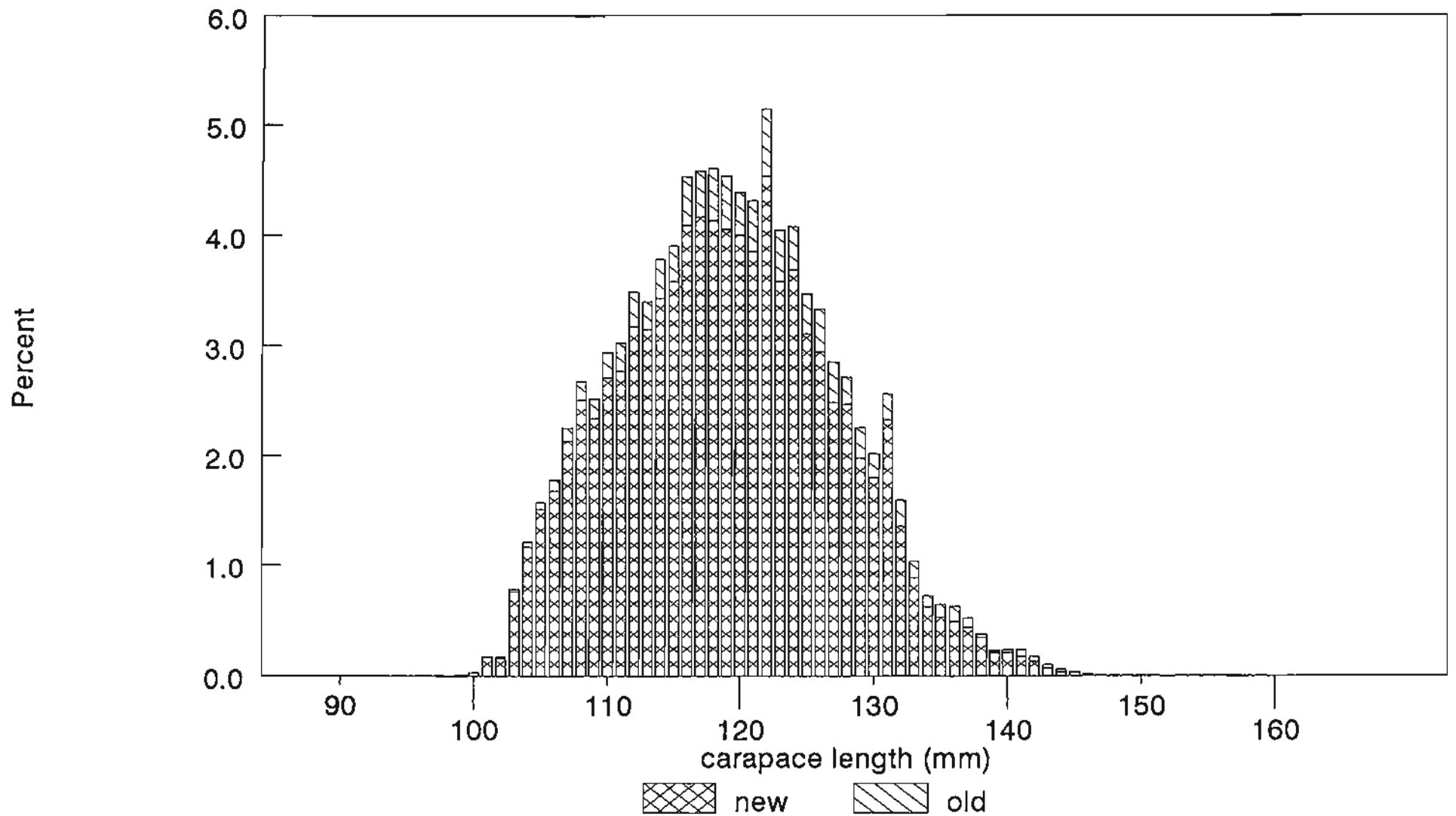


Figure 4. Length frequency distribution of new and old carapace age condition legal male red king crab, Norton Sound Section, Eastern Bering Sea, July 1 – August 28, 1993.

APPENDIX

Appendix Table 1. Comparison of annual summer commercial harvest of red king crab from Norton Sound Section, Eastern Bering Sea, by statistical areas, 1977-1993 (catch in pounds).^a

Statistical Area	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1992	1993	Totals
656402	308,302	90,187	288,889	918	3,098	2,832			132,363							193,079	1,017,648
646402	80,989					748										730	82,447
626402	38,995																38,995
656401			138,011	121,147	253,387	60,480	11,422	183,119	246,200		194,408	165,644	100,958	171	53,119	105,341	1,633,405
646401			155,972		1,319	17,532										1,963	176,786
636401				12,398	61,823	32,249	5,880	41	891				22,030		1,159	1,373	137,841
626401	31,572			4,830	399												38,801
656330			323,518	72,795	395,662	3,983	24,246	83,479	7,632		79,006	38,129	1,757		4,814	285	1,033,226
646330					4,716								5,212				9,928
626331	40,020					22											40,042
616331	7,893																7,893
656300			161,899		15,174												176,873
666431			146,029														146,029
676501					38												38
666402	12,036	515,778	534,938	183,581		17,585			32,992							535	1,297,445
676430		3,811	12,309	-0-	373	3,513			1,171								21,177
666401		179,212	486,947	205,400	381,510	79,580	325,045	116,254	5,341	408,848	50,744	21,895	115,257	162,263	10,632	746	2,549,674
676400		667,130	33,856	274	92,026	1,315	247		32					3,212			798,092
666330		353,016	506,050	367,446	141,513	8,990	1,192		389	70,815	2,963	13,020	1,275	27,185	4,305	31,758	1,528,717
676330		51,304	81,798	6,762	18,734	-0-											158,598
686330			1,860														1,860
666300		162,795	60,816	84,874	9,167	95		4,534									322,281
676300		13,238		126,231													139,469
666230		55,490			77												55,567
Totals	517,787	2,091,661	2,931,672	1,186,596	1,379,014	228,921	368,032	387,427	427,011	479,463	327,121	236,688	246,487	192,831	74,029	336,790	11,410,830

^a No commercial fishery occurred in 1991.

Appendix Table 2. Results of the population assessment surveys conducted for red king crab in Norton Sound since 1976.

Year	Date	Research Agency	Vessel	Gear Effort	Number of Red King Crab Captured ^a			Population Estimates of Legal Male Crab ^c	
					Sublegal Males	Legal ^b Males	Females	Numbers	Pounds
1976	9/02 - 9/05	NMFS	Miller-Freeman	Trawl	768	555	180	3,119,800	8,111,480
	9/16 -10/07			158 tows					
1979	7/26 - 8/05	NMFS	Miller-Freeman	Trawl	46	194	40	837,241	2,511,723
				71 tows					
1980	7/04 - 7/14	ADF&G	Altair	Pots	443	3,290	158	1,900,000	6,600,000 ^d
				397 lifts					
1981	6/28 - 7/14	ADF&G	Altair	Pots	4,097	3,415	1,933	1,285,195	4,755,221
				718 lifts					
1982	7/06 - 7/20	ADF&G	Aleutian #1	Pots	5,019	2,001	424	353,273	1,271,783
				689 lifts					
1982	9/05 - 9/11	NMFS	Miller-Freeman	Trawl	322	107	265	970,646	2,620,744
				50 tows					
1985	7/01 - 7/14	ADF&G	Arctic Sea	Pots	6,086	4,645	181	907,579	2,414,644
				642 lifts					
1985	9/16 -10/01	NMFS	Argosy	Trawl	266	163	151	1,203,000	3,369,000
				78 tows					
1988	8/16 - 8/30	NMFS	Miller-Freeman	Trawl	258	141	218	1,037,000	3,038,000
				82 tows					
1991	8/22 - 8/30	NMFS	Ocean Hope	Trawl	202	178	105	1,384,000	4,009,000
				53 tows					

^a Number of crab captured on ADF&G surveys represent data standardized for a 24 hour soak.

^b Legal male red king crab were defined as at least 106mm in carapace length for the 1976 NMFS survey; 105mm for the 1979 and 1985 NMFS survey; and at least 121mm in carapace width for all ADF&G surveys.

^c Population est. are valid for the date of the survey, ie either before or after the summer commercial fishery.

^d The 1980 estimate has been revised from the original estimate of 13.4 million pounds. The original estimate was thought inaccurate due to under-reporting of recovered tagged crab.

Appendix Table 3. Comparison of percent recruit and postrecruit king crab sampled from summer commercial fisheries, Norton Sound Section, Eastern Bering Sea, 1983 – 1993.

Year	Summer Commercial	
	Recruits (%)	Postrecruits (%)
1983	55	45
1984	59	41
1985	45	55
1986	48	52
1987	22	78
1988	25	75
1989	23	77
1990	21	79
1991 ^a	—	—
1992	28	72
1993	31	69

^a No data collected in summer 1991 due to closed fishery.